

Data Evaluation Report on the Acute Toxicity of Flufenacet-thiadone to Aquatic Vascular Plants (*Lemna gibba* G3)

PMRA Submission Number {.....}


EPA MRID Number 48897612

3Data Requirement:

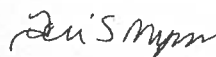
PMRA DATA CODE {.....}
EPA DP Barcode 405814
OECD Data Point {.....}
EPA MRID 48897612
EPA Guideline 850.4400

Test material: Flufenacet-thiadone **Purity:** 98.6%
Common name: Flufenacet-thiadone
Chemical name: IUPAC: Not reported
CAS name: Not reported
CAS No.: Not reported
Synonyms: FOE 5043-thiadone

Primary Reviewer: Kindra Bozicevich
Environmental Scientist, CDM Smith

Signature: 
Date: 05/02/2014

Secondary Reviewer: Teri S. Myers
Senior Scientist, CDM Smith

Signature: 
Date: 09/25/2014

Primary Reviewer: Geoffrey Sinclair
{EPA/OECD/PMRA}

Date: 10/31/14

Secondary Reviewer(s): {.....}
{EPA/OECD/PMRA}

Date: {.....}

Reference/Submission No.: {.....}

Company Code {.....} [For PMRA]
Active Code {.....} [For PMRA]
Use Site Category: {.....} [For PMRA]
EPA PC Code 121903

Date Evaluation Completed: {dd-mm-yyyy}

CITATION: Bruns, E. 2010. *Lemna gibba* G3 Growth inhibition test with flufenacet-thiadone under static conditions. Unpublished study performed by Bayer CropScience AG, Monheim, Germany. Report ID EBFOL144. Study sponsored by Bayer CropScience AG. Study initiated 21 June 2010 and completed 27 October 2010.

DISCLAIMER: This document provides guidance for EPA and PMRA reviewers on how to complete a data evaluation record after reviewing a scientific study concerning the acute toxicity of a pesticide to aquatic vascular plants. It is not intended to prescribe conditions to any external party for conducting this study nor to establish absolute criteria regarding the assessment of whether the study is scientifically sound and whether the study satisfies any applicable data requirements. Reviewers are expected to review and to determine for each study, on a case-by-case basis, whether it is scientifically sound and provides sufficient information to satisfy applicable data requirements. Studies that fail to meet any of the conditions may be accepted, if appropriate; similarly, studies that meet all of the conditions may be rejected, if appropriate. In sum, the reviewer is to take into account the totality of factors related to the test methodology and results in determining the acceptability of the study.

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EXECUTIVE SUMMARY:

In a 7-day acute toxicity study, the freshwater floating aquatic vascular plants (duckweed, *Lemna gibba* G3) were exposed to Flufenacet-thiadone at nominal concentrations of 0 (negative control) 1.25, 2.50, 5.00, 10.0, 20.0, 40.0, and 80.0 mg/L under static conditions. Mean measured concentrations were <0.100 (<LOQ, negative control), 1.54, 2.60, 5.13, 10.2, 20.8, 41.3, and 84.1 mg ai/L. The NOAEC values based on frond number yield, frond number growth rate, and frond area were <1.54 mg ai/L, in terms of mean measured concentrations. The NOAEC value based on frond area growth rate was 1.54 mg ai/L, in terms of mean measured concentrations. The **IC₀₅ for frond area growth rate was 1.101 mg/L** and was slightly lower than the range of concentrations tested so should be interpreted with some caution. IC₅₀ values based on frond number yield, frond number growth rate, frond area, and frond area growth rate were 13.88, 26.21, 10.34, and 20.09 mg ai/L, respectively, in terms of mean measured concentrations.

The mean frond number had inhibitions relative to the negative control of 15, 12, 28, 37, 65, 84, and 91% for mean measured concentrations of 1.54, 2.60, 5.13, 10.2, 20.8, 41.3, and 84.1 mg ai/L, respectively. The frond number growth rate had inhibitions relative to the negative control of 6.87, 5.77, 14.2, 19.7, 43.8, 76.6, and 100% for mean measured concentrations of 1.54, 2.60, 5.13, 10.2, 20.8, 41.3, and 84.1 mg ai/L, respectively. The frond number yield had inhibitions relative to the negative control of 17, 14, 31, 41, 71, 92, and 100% for mean measured concentrations of 1.54, 2.60, 5.13, 10.2, 20.8, 41.3, and 84.1 mg ai/L, respectively. The mean frond area had inhibitions relative to the negative control of 13, 11, 30, 45, 73, 88, and 91% for mean measured concentrations of 1.54, 2.60, 5.13, 10.2, 20.8, 41.3, and 84.1 mg ai/L, respectively. The frond area growth rate had inhibitions relative to the negative control of 1.90, 5.81, 11.1, 20.0, 51.4, 88.2, and 98.3% for mean measured concentrations of 1.54, 2.60, 5.13, 10.2, 20.8, 41.3, and 84.1 mg ai/L, respectively.

No morphological abnormalities were observed.

This study is **scientifically sound** and meets the guideline requirements for a toxicity test using a freshwater vascular plant. It is therefore classified as acceptable. After 7 days, the most sensitive endpoint was frond area with NOAEC and IC₅₀ values of <1.54 and 10.34 mg/L, based on mean measured concentrations.

Results Synopsis

Test Organism: Duckweed, *Lemna gibba* G3

Test Type (Flow-through, Static, Static Renewal): Static

Frond number yield

IC₀₅: 3.904 mg/L 95% C.I.: N/A to 5.292 mg/L

IC₅₀: 13.88 mg/L 95% C.I.: 12.29 to 15.68 mg/L

NOAEC: <1.54 mg/L

Probit Slope: N/A

Frond number growth rate

IC₀₅: 10.68 mg/L 95% C.I.: 5.051 to 12.97 mg/L

IC₅₀: 26.21 mg/L 95% C.I.: 23.99 to 28.64 mg/L

NOAEC: <1.54 mg/L

Probit Slope: N/A

Frond area

IC₀₅: 1.101 mg/L 95% C.I.: N/A to 1.907 mg/L

IC₅₀: 10.34 mg/L 95% C.I.: 9.006 to 11.87 mg/L

NOAEC: <1.54 mg/L

Probit Slope: N/A

Frond area growth rate

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IC₀₅: 6.755 mg/L 95% C.I.: 5.261 to 7.862 mg/L

IC₅₀: 20.09 mg/L 95% C.I.: 18.95 to 21.3 mg/L

NOAEC: 1.54 mg/L

Probit Slope: N/A

Endpoint(s) Effected: frond number yield, frond number growth rate, frond area, frond area growth rate

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I. MATERIALS AND METHODS

GUIDELINE FOLLOWED: The study was designed to comply with the procedures of the OECD Guideline 221 (2006). The following deviations from the U.S. EPA OCSPP 850.4400 (2012) guideline are noted:

1. The pH, total organic carbon (TOC), particulate matter, metals, pesticides, and chlorine concentrations of the dilution water were not reported.
2. Only 3 replicates were used per control and treatment group. A minimum of 4 replicates per level is recommended.
3. 15 fronds per replicate is recommended by EPA this study only had 12 fronds per treatment. A minimum of 5 plants per treatment is recommended but this study did not specify number of plants. 7 concentrations were used in the test.

These deviations do not affect the validity of the study.

COMPLIANCE: Signed and dated GLP, Quality Assurance, and No Data Confidentiality statements were provided. The study was performed in accordance with OECD Principles of GLP and Principles of GLP according to Annex 1 of the German chemical law (ChemG) except for the screening work for contaminants in the dilution water.

A. MATERIALS:

1. Test material Flufenacet-thiadone

Description: White solid

Lot No./Batch No. : AE 1258593-01-01; SES 10558-3-5

Purity: 98.6%

Stability of compound under test conditions: Stable. Day 7 measured concentrations ranged from 74 to 106% of their initial measured counterparts.

(OECD recommends water solubility, stability in water and light, pKa, Pow, and vapor pressure of test compound)

Storage conditions of test chemicals: Room temperature.

Physicochemical properties of Flufenacet-thiadone.

Parameter	Values	Comments
Water solubility at 20EC	Not reported	
Vapor pressure	Not reported	
UV absorption	Not reported	
	Not reported	

Data Evaluation Report on the Acute Toxicity of Flufenacet-thiadone to Aquatic Vascular Plants (*Lemna gibba* G3)

PMRA Submission Number {.....}

EPA MRID Number 48897612

Parameter	Values	Comments
pKa		
Kow	Not reported	

2. Test organism:

Name: Duckweed, *Lemna gibba* EPA requires a vascular species: *Lemna gibba*.

Strain, if provided: G3

Source: In-house cultures originally obtained from Dr. Janet Slovin, Horticulture Crops Quality Laboratory, U.S. Department of Agriculture, Beltsville, MD 20705 U.S.A.

Age of inoculum: 7-10 days

Method of cultivation: Cultured and tested in 20X AAP medium under continuous light (6500-10,000 lux) at $24 \pm 2^\circ\text{C}$.

B. STUDY DESIGN:

1. Experimental Conditions

a. Range-finding study: None reported.

b. Definitive Study

Table 1: Experimental Parameters

Parameter	Details	Remarks
		Criteria
Acclimation period:	Continuously cultured in-house	
Culturing media and conditions: (same as test or not)	Same as test	
Health: (any mortality observed)	Actively growing	
<u>Test system</u> Static/static renewal	Static	EPA expects the test concentrations to be renewed every 3 to 4 days (one renewal for the 7 day test, 3-4 renewals for the 14 day test).
Renewal rate for static renewal	N/A	
Incubation facility	Growth incubator	
Duration of the test	7 days	

Data Evaluation Report on the Acute Toxicity of Flufenacet-thiadone to Aquatic Vascular Plants (*Lemna gibba* G3)

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Parameter	Details	Remarks
		Criteria
		EPA requires a duration of 14 days. Seven day studies will be accepted for review by the Agency.
<u>Test vessel</u> Material: (glass/stainless steel) Size: Fill volume:	Glass 470 mL 200 mL	Glass dishes (10 cm i.d., 6 cm in height) covered with glass lids to permit gas exchange
<u>Details of 20X AAP medium</u> pH in new solutions: pH in old solutions: Chelator used: Carbon source:	7.4 to 7.5 8.6 to 8.7 Na ₂ EDTA2H ₂ O NaHCO ₃	EPA recommends the following culture media: Modified Hoagland's E+ or 20X-AAP. Chelating agents (e.g. EDTA) are recommended in the nutrient medium for optimum cell growth. Lower concentrations of chelating agents (down to one-third of the normal concentration recommended for AAP medium) may be used in the nutrient medium used for test solution preparation if it is suspected that the chelator will interact with the test material. ASTM reference, E1415-91 and D 3978-80 (reapproved 1987).
If non-standard nutrient medium was used, detailed composition provided (Yes/No)	A standard medium was used. A detailed composition was provided.	
<u>Dilution water</u> source/type: pH: water pretreatment (if any): Total Organic Carbon: particulate matter: metals: pesticides: chlorine:	Ultra-pure water Not reported Purified (Milli-Q-water) Not reported Not reported Not reported Not reported Not reported	EPA recommends a pH of ~5.0. A solution pH of 7.5 is acceptable if type 20X-AAP nutrient media is used.

Data Evaluation Report on the Acute Toxicity of Flufenacet-thiadone to Aquatic Vascular Plants (*Lemna gibba* G3)

PMRA Submission Number {.....}

EPA MRID Number 48897612

Parameter	Details	Remarks
		Criteria
Indicate how the test material is added to the medium (added directly or used stock solution)	A stock solution was prepared by dissolving 106.9 mg of the test substance in 1317 mL of test medium. The resulting solution was stirred and sonicated, then transferred to a dilution series to obtain the concentration levels used in the study.	
Aeration or agitation	None	
<u>Sediment used (for rooted aquatic vascular plants)</u> Origin: Textural classification (%sand, silt, and clay): Organic carbon (%): Geographic location:	N/A	
<u>Number of replicates</u> Negative control: Solvent control: Treatments:	3 N/A 3	
Number of plants/replicate	Not reported	EPA requires 5 plants.
Number of fronds/plant	Not reported (total of 12 fronds per vessel)	EPA requires 3 fronds per plant.
<u>Test concentrations</u> Nominal: Mean measured:*	0 (negative control), 1.25, 2.50, 5.00, 10.0, 20.0, 40.0, and 80.0 mg/L <0.100 (<LOQ, negative control), 1.54, 2.60, 5.13, 10.2, 20.8, 41.3, and 84.1 mg ai/L	*Mean measured concentrations were determined by the reviewer as the mean of Day 0 and Day 7 measured concentrations. EPA requires at least 5 test concentrations with a dose range of 2X or 3X progression.
Solvent (type, percentage, if used)	N/A	

Data Evaluation Report on the Acute Toxicity of Flufenacet-thiadone to Aquatic Vascular Plants (*Lemna gibba* G3)

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Parameter	Details	Remarks
		Criteria
Method and interval of analytical verification	Test concentrations were measured in newly prepared solutions on Day 0 and from expired solutions on Day 7 using HPLC-UV.	
<u>Test conditions</u> Temperature: Photoperiod: Light intensity and quality:	23.7 to 26.0°C Continuous 7960 to 8820 lux (quality not reported)	
<u>Reference chemical (if used)</u> name: concentrations:	N/A	
Other parameters, if any	N/A	

2. Observations:

Table 2: Observation parameters

Parameters	Details	Remarks/Criteria
Parameters measured (e.g.,: number of fronds, plant dry weight or other toxicity symptoms)	Frond number Frond area Growth rate	
Measurement technique for frond number and other end points	Counting of fronds and determination of total frond area was carried out using the LemnaTec Scanalyzer machine.	
Observation intervals	Fronds were counted on days 0, 2, 5, and 7.	
Other observations, if any	Visual observations were made on study days 2, 5, and 7.	
Indicate whether there was an exponential growth in the control	Yes, the doubling time in the negative control was 2.0 days.	
Were raw data included?	Yes	

II. RESULTS and DISCUSSION:

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A. INHIBITORY EFFECTS:

After 7 days, the mean frond number of the negative control was 131 fronds, yielding inhibitions relative to the negative control of 15, 12, 28, 37, 65, 84, and 91% for mean measured concentrations of 1.54, 2.60, 5.13, 10.2, 20.8, 41.3, and 84.1 mg ai/L, respectively. The study author did not assess frond number data.

The mean 0-7 day frond number growth rate of the negative control was 0.342/day, yielding inhibitions relative to the negative control of 6.87, 5.77, 14.2, 19.7, 43.8, 76.6, and 100% for mean measured concentrations of 1.54, 2.60, 5.13, 10.2, 20.8, 41.3, and 84.1 mg ai/L, respectively. The NOAEC and EC50 values reported by the study author based on frond number growth rate were <1.25 and 20.8 mg/L, respectively, in terms of nominal concentrations.

The mean 0-7 day frond number yield of the negative control was 119 fronds, yielding inhibitions relative to the negative control of 17, 14, 31, 41, 71, 92, and 100% for mean measured concentrations of 1.54, 2.60, 5.13, 10.2, 20.8, 41.3, and 84.1 mg ai/L, respectively. The study author did not assess frond number yield data.

After 7 days, the mean frond area of the negative control was 873 mm², yielding inhibitions relative to the negative control of 13, 11, 30, 45, 73, 88, and 91% for mean measured concentrations of 1.54, 2.60, 5.13, 10.2, 20.8, 41.3, and 84.1 mg ai/L, respectively. The study author did not assess frond area data.

The mean 0-7 day frond area growth rate of the negative control was 0.340/day, yielding inhibitions relative to the negative control of 1.90, 5.81, 11.1, 20.0, 51.4, 88.2, and 98.3% for mean measured concentrations of 1.54, 2.60, 5.13, 10.2, 20.8, 41.3, and 84.1 mg ai/L, respectively. The NOAEC and EC50 values reported by the study author based on frond area growth rate were 1.25 and 18.3 mg/L, respectively, in terms of nominal concentrations.

No morphological abnormalities were observed.

Data Evaluation Report on the Acute Toxicity of Flufenacet-thiadone to Aquatic Vascular Plants (*Lemna gibba* G3)

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EPA MRID Number 48897612

Table 3: Effect of Flufenacet-thiadone on frond number of duckweed, *Lemna gibba*

Treatment Mean measured and (nominal) concentrations mg/L	Initial frond number/test solution	frond number at			
		2 days	5 days	7 days	
				frond number	% inhibition ^a
Negative control	12	23	67	131	N/A
1.54(1.25)	12	22	59	111	15
2.60(2.50)	12	24	61	115	12
5.13(5.00)	12	22	52	94	28
10.2(10.0)	12	21	49	82	37
20.8(20.0)	12	19	34	46	65
41.3(40.0)	12	13	19	21	84
84.1(80.0)	12	13	12	12	91
Reference chemical (if used)	N/A				

^a Calculated by the reviewer relative to the negative control.

Table 4: Effect of Flufenacet-thiadone on frond number of duckweed, *Lemna gibba*

Treatment Mean measured and (nominal) concentrations mg/L	Initial frond number/test solution (or other endpoint)	Frond number growth rate (day ⁻¹)		Frond number yield ^a	
		0-7 days	% inhibition	0-7 days	% inhibition ^b
Negative control	12	0.342	N/A	119.0	N/A
1.54(1.25)	12	0.318	6.87	99.3	17
2.60(2.50)	12	0.322	5.77	102.7	14
5.13(5.00)	12	0.293	14.2	82.3	31
10.2(10.0)	12	0.274	19.7	70.0	41
20.8(20.0)	12	0.192	43.8	34.0	71
41.3(40.0)	12	0.080	76.6	9.0	92
84.1(80.0)	12	0.0	100	0.0	100

^a Calculated by the reviewer as final minus initial frond number

^b Calculated by the reviewer relative to the negative control.

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EPA MRID Number 48897612

Table 5: Effect of Flufenacet-thiadone on biomass of duckweed, *Lemna gibba*

Treatment Mean measured and (nominal) concentrations mg/L	FronD area		FronD area growth rate (day ⁻¹)	
	Day 7	% inhibition ^a	0-7 days	% inhibition
Negative control	873	N/A	0.340	N/A
1.54(1.25)	756	13	0.333	1.90
2.60(2.50)	777	11	0.320	5.81
5.13(5.00)	613	30	0.302	11.1
10.2(10.0)	480	45	0.272	20.0
20.8(20.0)	233	73	0.165	51.4
41.3(40.0)	106	88	0.040	88.2
84.1(80.0)	76	91	0.006	98.3

^a Calculated by the reviewer relative to the negative control.

Table 6: Statistical endpoint values.* (calculated by the study author based on nominal concentrations)

Statistical Endpoint	FronD number	FronD number yield	FronD number growth rate	FronD area	FronD area growth rate
NOAEC (mg/L)	Not calculated	Not calculated	<1.25	Not calculated	1.25
LOAEC (mg/L)	Not calculated	Not calculated	<1.25	Not calculated	2.50
IC ₅₀ or EC ₅₀ (mg/L) (95% C.I.)	Not calculated	Not calculated	20.8 (15.9-27.3)	Not calculated	18.3 (14.9-22.7)
Reference chemical NOAEC IC ₅₀ /EC ₅₀	N/A				

* Do not use this table, if the study was deemed unacceptable.

N/A. Not applicable.

B. REPORTED STATISTICS:

The study author statistically analyzed the endpoints for frond number growth rate and frond area growth rate using ToxRat Professional statistical software. The data were assessed for normality and homogeneity of variance using Shapiro-Wilk's and Bartlett's tests, respectively. If the data passed these tests, Dunnett's Multiple Comparison Test was used to determine the NOEC and LOEC. If the data did not pass, the NOEC was determined using Kruskal-Wallis' Test. The EC_x values were calculated by probit analysis using linear max. likelihood regression. All analyses were based on nominal concentrations.

Data Evaluation Report on the Acute Toxicity of Flufenacet-thiadone to Aquatic Vascular Plants (*Lemna gibba* G3)

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C. VERIFICATION OF STATISTICAL RESULTS:

Statistical Method: The reviewer assessed the endpoints for frond number yield, frond number growth rate, frond area, and frond area growth rate using CETIS version 1.8.7.12 statistical software using backend database settings implemented by EFED on 25 March 2014. Frond yield, frond area growth rate and frond number growth rate data were confirmed to be normally distributed and have homogeneous variances using Shapiro-Wilk's and Bartlett's tests, respectively, and the data were therefore analyzed using William's test. Frond area data were not normally distributed and had unequal variances and were therefore analyzed using a Jonckheere-Terpstra Test. The ICx values were calculated using Bruce-Versteeg regression. All toxicity values are reported in terms of mean measured exposure concentrations.

Frond number yield

IC₀₅: 3.904 mg/L 95% C.I.: N/A to 5.292 mg/L

IC₅₀: 13.88 mg/L 95% C.I.: 12.29 to 15.68 mg/L

NOAEC: <1.54 mg/L

Probit Slope: N/A

Frond number growth rate

IC₀₅: 10.68 mg/L 95% C.I.: 5.051 to 12.97 mg/L

IC₅₀: 26.21 mg/L 95% C.I.: 23.99 to 28.64 mg/L

NOAEC: <1.54 mg/L

Probit Slope: N/A

Frond area

IC₀₅: 1.101 mg/L 95% C.I.: N/A to 1.907 mg/L

IC₅₀: 10.34 mg/L 95% C.I.: 9.006 to 11.87 mg/L

NOAEC: <1.54 mg/L

Probit Slope: N/A

Frond area growth rate

IC₀₅: 6.755 mg/L 95% C.I.: 5.261 to 7.862 mg/L

IC₅₀: 20.09 mg/L 95% C.I.: 18.95 to 21.3 mg/L

NOAEC: 1.54 mg/L

Probit Slope: N/A

D. STUDY DEFICIENCIES:

There were not any deficiencies that influenced the results of this study.

E. REVIEWER'S COMMENTS:

The reviewer's results were in agreement with those of the study author. The study author's toxicity values were based on nominal concentrations whereas the reviewer's values were based on mean measured concentrations. The reviewer's results are presented in the Executive Summary and Conclusions sections of this report.

The laboratory portion of the definitive test was conducted from 07 to 14 July 2010.

F. CONCLUSIONS:

This study is **scientifically sound** and meets the guideline requirements for a toxicity test using a freshwater vascular plant. It is therefore classified as acceptable. After 7 days, the most sensitive endpoint was frond area with NOAEC and IC₅₀ values of <1.54 and 10.34 mg/L, based on mean measured concentrations.

Frond number yield

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Frond number growth rate

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NOAEC: <1.54 mg/L

Probit Slope: N/A

Frond area

IC₀₅: 1.101 mg/L 95% C.I.: N/A to 1.907 mg/L

IC₅₀: 10.34 mg/L 95% C.I.: 9.006 to 11.87 mg/L

NOAEC: <1.54 mg/L

Probit Slope: N/A

Frond area growth rate

IC₀₅: 6.755 mg/L 95% C.I.: 5.261 to 7.862 mg/L

IC₅₀: 20.09 mg/L 95% C.I.: 18.95 to 21.3 mg/L

NOAEC: 1.54 mg/L

Probit Slope: N/A

Endpoint(s) Effected: frond number yield, frond number growth rate, frond area, frond area growth rate

III. REFERENCES:

OECD Guideline 221 "Lemna sp. Growth Inhibition Test" (March 23, 2006).

Statistical Software "ToxRat Professional", version 2.09, produced by ToxRat® Solutions GmbH, 52477 Alsdorf, Germany (November 8, 2006).

ToxRat® Validation Document from ToxRat® Solutions GmbH, valid for ToxRat® Version 2.09 (released January 25, 2004).

The British Crop Protection Council (2002), The e-Pesticide Manual 2002-2003. 12th Edition, V.2.2.

M. Dorgerloh, "LemnaTec Scanalyzer Validation Program", Bayer CropScience AG, unpublished report DOM 23038 of April 7, 2004.

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CETIS Summary Report

Report Date: 30 Apr-14 09:45 (p 1 of 2)
 Test Code: 121903 48897612 | 07-9267-4802

OCSPP 850.4400 Aquatic Vascular Plant			Bayer CropScience AG		
Batch ID:	10-5446-2817	Test Type:	Lemna Growth (7-d)	Analyst:	
Start Date:	07 Jul-10	Protocol:	OCSPP 850.4400 Aquatic Plant (Lemna)	Diluent:	Lemna Medium, 20X-AAP
Ending Date:	14 Jul-10	Species:	Lemna Gibba	Brine:	
Duration:	7d 0h	Source:	Lab In-House Culture	Age:	7-10
Sample ID:	04-9578-3740	Code:	48897612	Client:	CDM Smith
Sample Date:	07 Jul-10	Material:	Flufenacet	Project:	Unknown
Receive Date:		Source:	Bayer CropScience AG		
Sample Age:	NA	Station:			
Batch Note: 121903 48897612 static renewal					
Sample Note: 121903 48897612 degradation product flufenacet-thiadone					

Comparison Summary							
Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
10-9709-0827	Area Growth Rate	1.54	2.6	2.001	5.2%		Dunnett Multiple Comparison Test
12-3480-2864	Area Growth Rate	1.54	2.6	2.001	3.85%		Williams Multiple Comparison Test
14-4442-3128	Frond Area	<1.54	1.54	NA	NA		Jonckheere-Terpstra Step-Down Test
00-1086-2727	Frond Area	<1.54	1.54	NA	10.3%		Mann-Whitney U Two-Sample Test
10-4314-3986	Frond Number	<1.54	1.54	NA	13.6%		Dunnett Multiple Comparison Test
12-6950-3488	Frond Number	<1.54	1.54	NA	10.0%		Williams Multiple Comparison Test
03-3761-0141	Frond Number Growth Rate	2.6	5.13	3.652	7.04%		Dunnett Multiple Comparison Test
05-6505-2593	Frond Number Growth Rate	<1.54	1.54	NA	5.2%		Williams Multiple Comparison Test

Point Estimate Summary							
Analysis ID	Endpoint	Level	mg ai/L	95% LCL	95% UCL	TU	Method
11-1502-7773	Area Growth Rate	IC5	6.755	5.261	7.862		Nonlinear Regression
		IC10	8.593	7.465	9.595		
		IC25	12.85	11.76	13.94		
		IC50	20.09	18.95	21.3		
06-2143-8607	Frond Area	IC5	1.101	N/A	1.907		Nonlinear Regression
		IC10	1.805	1.123	2.498		
		IC25	4.127	3.332	5.007		
		IC50	10.34	9.006	11.87		
08-3943-5826	Frond Number	IC5	3.904	N/A	5.292		Nonlinear Regression
		IC10	5.166	3.638	6.421		
		IC25	8.251	6.828	9.703		
		IC50	13.88	12.29	15.68		
04-2981-2451	Frond Number Growth Rat	IC5	10.68	5.051	12.97		Nonlinear Regression
		IC10	13.02	10.17	15.18		
		IC25	18.14	15.75	20.44		
		IC50	26.21	23.99	28.64		

CETIS Summary Report

Report Date: 30 Apr-14 09:45 (p 2 of 2)
 Test Code: 121903 48897612 | 07-9267-4802

OCSP 850.4400 Aquatic Vascular Plant

Bayer CropScience AG

Area Growth Rate Summary											
C-mg ai/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.34	0.3249	0.3551	0.333	0.344	0.003512	0.006083	1.79%	0.0%
1.54		3	0.3337	0.3046	0.3628	0.325	0.347	0.006766	0.01172	3.51%	1.86%
2.6		3	0.32	0.2955	0.3445	0.312	0.331	0.005686	0.009849	3.08%	5.88%
5.13		3	0.3023	0.2823	0.3224	0.293	0.307	0.004667	0.008083	2.67%	11.08%
10.2		3	0.2717	0.2688	0.2745	0.271	0.273	0.000667	0.001155	0.43%	20.1%
20.8		3	0.1653	0.1465	0.1841	0.16	0.174	0.004372	0.007572	4.58%	51.37%
41.3		3	0.04	0.007138	0.07286	0.025	0.05	0.007638	0.01323	33.07%	88.24%
84.1		3	0.006	0.001032	0.01097	0.004	0.008	0.001155	0.002	33.33%	98.24%

Fron Area Summary											
C-mg ai/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	872.7	746	999.4	822	924	29.45	51	5.85%	0.0%
1.54		3	756	711.1	800.9	737	773	10.44	18.08	2.39%	13.37%
2.6		3	777	551.3	1003	713	881	52.46	90.86	11.69%	10.96%
5.13		3	612.7	363.8	861.6	520	719	57.85	100.2	16.35%	29.79%
10.2		3	480.3	460.4	500.3	472	488	4.631	8.021	1.67%	44.96%
20.8		3	233	205	261	220	240	6.506	11.27	4.84%	73.3%
41.3		3	106	103.5	108.5	105	107	0.5774	1	0.94%	87.85%
84.1		3	76	73.52	78.48	75	77	0.5774	1	1.32%	91.29%

Fron Number Summary											
C-mg ai/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	119	101.8	136.2	111	123	4	6.928	5.82%	0.0%
1.54		3	99.33	94.16	104.5	97	101	1.202	2.082	2.1%	16.53%
2.6		3	102.7	73.87	131.5	95	116	6.692	11.59	11.29%	13.73%
5.13		3	82.33	41.19	123.5	65	98	9.563	16.56	20.12%	30.81%
10.2		3	70	61.04	78.96	66	73	2.082	3.606	5.15%	41.18%
20.8		3	34	29.03	38.97	32	36	1.155	2	5.88%	71.43%
41.3		3	9	6.516	11.48	8	10	0.5774	1	11.11%	92.44%
84.1		3	0	0	0	0	0	0	0		100.0%

Fron Number Growth Rate Summary											
C-mg ai/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	3	0.3417	0.3208	0.3625	0.332	0.347	0.004842	0.008386	2.46%	0.0%
1.54		3	0.318	0.3114	0.3246	0.315	0.32	0.001528	0.002646	0.83%	6.93%
2.6		3	0.322	0.2875	0.3565	0.313	0.338	0.008021	0.01389	4.31%	5.76%
5.13		3	0.2933	0.2295	0.3572	0.266	0.317	0.01484	0.0257	8.76%	14.15%
10.2		3	0.2743	0.2578	0.2909	0.267	0.28	0.003844	0.006658	2.43%	19.71%
20.8		3	0.192	0.1771	0.2069	0.186	0.198	0.003464	0.006	3.13%	43.8%
41.3		3	0.08	0.06261	0.09739	0.073	0.087	0.004041	0.007	8.75%	76.59%
84.1		3	0	0	0	0	0	0	0		100.0%